

James Kruse (Entomologist), Ken Zogas, Nicholas Lisuzzo and Steve Swenson (Biological Science Technicians), USDA Forest Service, Alaska Region, State and Private Forestry.

Alder-feeding Sawflies of Alaska

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Cover Photos: Top - *H. crocea* larvae
Bottom Left - A *M. pulveratum* larva
Bottom right - An *E. ovata* larva

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In recent years, Alaskan alders have been increasingly assaulted by a variety of insects, pathogens and abiotic agents. Recent examples are: vast areas of generalized foliage browning in interior, south-central, and southwestern Alaska; a six year outbreak of the generalist, native, hardwood defoliator, *Sunira verberata* in Katmai National Park; extensive defoliation by the invasive alder woolly sawfly, *Eriocampa ovata*, in the Anchorage area beginning in the mid-1990's; a wide variety of canker fungi, most commonly *Valsa melanodiscus*, causing premature leaf death, stem dieback, stem death, and whole clump mortality at local and landscape levels throughout Alaska; and finally, severe defoliation by a new, exotic sawfly, *Monsoma pulveratum*, primarily in south-central Alaska. Further, more than one of these agents are frequently found acting in concert—several species of defoliators for example, or insect/pathogen interactions.

The three primary, alder-feeding sawflies in Alaska are: *Eriocampa ovata*, the alder woolly sawfly; *Hemichroa crocea*, the striped alder sawfly; and *Monsoma pulveratum*, the European green alder sawfly. Both the green alder and alder woolly sawflies are nonnative insects, while the striped alder sawfly is a native, circumpolar sawfly. All three are in the same insect order, Hymenoptera (bees, wasps, ants,

and sawflies), and the same insect family, Tenthredinidae. These sawflies share a number of characteristics: all insert a single egg through the leaf cuticle into the leaf tissue using a strong, somewhat 'saw-like' ovipositor; larvae are all external leaf feeders; all pupate in the ground in an excavated chamber where they spin a cocoon or line the chamber with silk; and finally, all exhibit a strong preference for thin-leaf alder (*Alnus incana* subsp. *tenuifolia*) as a primary host. The adults are all small, compact insects, and even though they are wasps, to the casual observer they more often resemble flies. Although they are included in the same insect family as wasps and bees, they are neither venomous, nor capable of stinging.

Life History

The green alder sawfly is the first of the three sawflies to emerge in the spring. Egg-laying is in progress in mid-May, at



Figure 1. Extensive alder defoliation and dieback along the Susitna River, Alaska.

approximately 15°C, when the alder leaves are just beginning to flush. Both alder woolly and striped alder sawfly adults emerge from mid to late June. Egg-laying commences immediately and continues for several weeks as new adults emerge. Green alder sawfly egg deposition differs markedly from the two other sawfly species. Egg deposition for green alder sawflies is on the upper leaf surface, alder woolly sawflies egg deposition is on the underside of the leaf along and into the midrib, and striped alder sawflies egg deposition is along the leaf petiole.

Embryonic sawfly development for all three species is 1-2 weeks. Upon hatching, green alder sawfly larvae migrate to the lower leaf surface. All three species feed openly on the leaves, consuming (in most cases) all the soft leaf tissue, leaving behind only the leaf veins and midrib. Striped alder sawfly larvae feed gregariously, while the alder woolly and green alder sawflies feed singly. However, in high larval density situations, it is not uncommon to find five or more green alder sawfly larvae per leaf. At times, only one species might be found on an individual alder. It is possible to have two or even all three species feeding on the same plant, or even on the same leaf.

Appearances differ markedly among the larvae. Green alder sawfly larvae are creamy-colored to very pale green upon hatching. As they grow and develop, they change to a vibrant bluish-green. Full grown larvae can exceed 18 mm in length. Alder woolly sawfly larvae secrete a white, waxy, hair-like covering on their bodies. As they grow, this covering becomes denser. In their last



Figure 2. a- *H. crocea* egg sites. b- *M. pulveratum* egg sites. c- *E. ovata* egg sites. d- An alder leaf after larval feeding.

instar (stage of larval development), the covering is shed, exposing a very pale green body. The larvae of striped alder sawfly are yellowish- to greenish- brown with two black lateral stripes on either side of their body. They are quite robust, though slightly shorter in length at full development than alder woolly or green alder sawflies. When larval development is complete, the woolly alder and striped alder sawflies drop to the ground and burrow into the soil beneath the leaf litter. There, they excavate a small chamber 1-4.5 cm beneath the soil surface. The larvae then enter a pre-pupal state and remain in this condition throughout the winter. In spring, when the ground begins to warm and reach the threshold temperature for each species to continue development, the pre-pupae change to pupae, and after some time, they emerge as adults. By contrast, the green alder sawfly typically

burrows into woody material, and spends the winter in stumps, broken branches and down logs. This behavior is believed to be unique to this genus of sawfly, and may account for their early emergence in the spring.

Detection and Damage

The damage to the host alders due to sawfly feeding is quite obvious. Early in the season, as active feeding begins, numerous small holes appear in the leaves as the small larvae feed. This results in a characteristic “shotgun” appearance. In time, these small feeding voids coalesce into larger holes. Ultimately, the larvae consume all the soft tissue between the leaf veins leaving behind only the stouter veins and leaf midrib. The shrub takes on a thin, brownish appearance easily seen from the ground or aerially. Alder, like most hardwood tree species, is able to withstand several seasons of severe defoliation suffering nothing more than growth loss and possibly branch dieback. With the case of alder however, severe defoliation can reduce its nitrogen contribution to the soil by more than 70% annually. Alder mortality has been observed, in other defoliator outbreaks, after 5 or more consecutive seasons of severe defoliation.

Control Options

Since thin-leaf alder is primarily a riparian species and an important component of many salmon spawning streams, implementation of sawfly control measures would be difficult. Some insecticides have deleterious effects on aquatic insects as well as the terrestrial insects they specifically

target. Many of the infested alders lie within an area normally excluded from operational insecticide spray programs because of its ecological sensitivity.

Homeowners do not normally encounter problems with these insects. If an individual is concerned about a small group of infested alders on their property, effective control can be achieved either through hand-picking of the larvae from the leaves or treatment with a strong jet of water. Repeating these activities several times throughout the summer may be required.

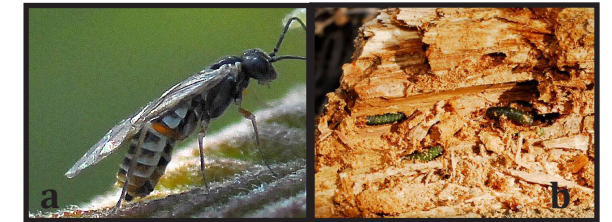


Figure 3. a. An adult *M. pulveratum* b. Overwintering sites for *M. pulveratum* larvae

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